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LOOP MATERIAL

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Description

[0001]

The invention concerns a loop material of a hook-loop connection according to the preamble of Claim 1.

[0002]

Adhesive fasteners on baby diapers have been common up to now. They can be opened and closed a number of times but are very sensitive to soiling. At the same time, hook-loop connecters have also been used on baby diapers. These connecters are also called Velcro fasteners.

[0003]

Such fasteners consist of a fabric that carries a large number of small prongs provided with barbs and another fabric provided with loops. Upon contact of the two fabrics, the prongs with their barbs hook onto the loops, so that the two fabrics become hooked together. Since the prongs with barbs are elastic, the two fabrics can again be separated. The unhooking forces are relatively small, whereas the shear forces are very large. Since the fastening takes place in a purely mechanical manner, soiling by liquid, grease, or emulsions does not adversely affect the mode of action.

[0004]

The reliable functioning of a hook-loop connection requires that the hooks and loops be adapted to one another, that the loops have sufficient strength so that they are not destroyed with the release of the connection, and that there is a high statistical reliability that the hooks will become connected to the loops on a given surface.

[0005]

EP 0 341 993 A1 discloses a loop material in which a fiber layer made of smooth fibers is affixed on a support layer. The fastening takes place by narrow, linear, parallel bonding areas.

The fibers are thereby all uniformly oriented and the bonding areas run transverse to the orientation of the fibers. In an alternative implementation, the bonding areas are interrupted and staggered by half their mutual distance.

[0006]

As a result of the exactly uniform orientation of the fibers, it is necessary that the hooks of the hook-loop connecters are also correspondingly oriented so that a connection can be established. Otherwise, only one small part of the hooks would grip the loops from behind.

[0007]

Furthermore, EP 0 765 616 A1 discloses, a loop material for a hook-loop connecter, in which a fabric is used. On one side of the fabric, loops are produced by an additional process, such as needle punching or a water jet process; the loops are entangled with one another. On the other side of the fabric, a consolidation is effect by a thermal process. This type of fabrication of the loops is not very gentle to the material, nor does it not allow the manufacturer to dimension the loop width effectively. Thus, there is the risk that some of the fibers will be destroyed or that some loops will be so large that they can no longer take on a fastening function.

[0008]

Furthermore, WO 92/20 250 discloses a multilayer material that consists of a support layer, a distancing layer, and a hooking layer. The fibers of the hooking layer are not shaped as loops and therefore do not form the necessary volume which the hooks must first penetrate in order to be able to grip the fibers from behind. Rather, this volume is made available by the distancing layer. In addition, the stretching capacity of the hooking layer in the longitudinal direction would be smaller than is the case with a loop layer. In the described layer sequence, support layer - distancing layer - hooking layer, this leads to increased rigidity, which is common for sandwiched materials.

[0009]

WO96/04812 is considered the closest state of the art. It describes the formation of so-called "construction bond pattern elements" in a fleece. These connection patterns should have geometrical shapes. Connection points of this pattern should ensure the connection between the fleece used and a support material. In addition, the fleece should have connection points among one another between the fibers. Loop cushions are formed in such a way that the carrier material is elastic and extended. The fleece is placed on this support material and subsequently connected to the support material. By means of a release from tension of the support material after the

connection, the fibers of the fleece material are straightened out and form loop cushions. The usable fleece material should have a basis weight between 12 g/m^2 to 48 g/m^2 before connection to the support material and can be made from polypropylene, for example. It should also be possible to use a carded material.

[0010]

The problem of the invention is to devise a flexible loop material of a hook-loop connection that is better adapted to the textile support materials to be fastened and that also offers high fastening reliability with small contact surfaces.

[0011]

The solution according to the preamble of Claim 1 is effected by the features indicated in the characterizing portion.

[0012]

The production process of the loop material in accordance with the invention is based on a fleece formation technology, so that the usual machines of the nonwoven industry can be used for the production of textile fabrics. However, the usual fleeces are not readily suitable for use as loop material. This is solved by the invention in that only fibers or filaments are used that lead to a voluminous layer as a result of their geometrical structure, and in that this layer is connected to the support layer via specially shaped bonding areas that leave behind sufficiently large hookable flat areas. As a result of their geometrical shape, the fibers or filaments, billow out and resist the pressure on the support layer between the bonding areas. In this way, the fiber or filament volume between the bonding areas is retained, whereby the fibers or filaments automatically become loops between these connections due to the two-sided connection to the upper layer on the bonding areas.

[0013]

The volume of the rhomboid-defined loop cushions makes it possible for the hooks of the connection element to penetrate the layer and enables the gripping of the fibers or filaments from behind. Furthermore, the flexibility of the material is retained.

[0014]

During thermobonding, the fibers or filaments are not damaged or stretched in their free areas. The loop length is thus not increased, so that an undesired play is avoided between the intermeshing hooks and loops.

[0015]

The narrow, linear, parallel bonding areas can be continuous or interrupted. In interrupted bonding areas, a large part of the original volume of the fiber or filament layer is retained. However, with short fibers, a fastening point on the support layer may then be lacking. With continuous bonding areas, on the other hand, the probability is very high that the fibers are fastened on both sides of the support layer.

[0016]

The fiber layer can be formed by a carded interlaid scrim or bonded fiber fabric, in which, during the production process, the fibers have been given a preferred direction in the machine. The narrow, linear, parallel bonding areas are at an acute angle to the preferred direction of the fibers. This ensures the high probability of the orientation of the bonding areas extending at an angle to the orientation of most of the fibers, whereby a very high fraction of the fibers is affixed on both sides of the support layer.

[0017]

The thickness of the fibrous interlaid scrim or the bonded fiber fabric exceeds 0.15 mm. Moreover, the weight per unit area of the fibrous interlaid scrim or bonded fiber fabric exceeds 8 g/m^2. This ensures that the barbs of the prong can also reliably grip the fibers from behind.

[0018]

Also, the fineness of the fibers exceeds 1.7 dtex. Thus, sufficient strength is realized, so as to make possible at least two opening and closing cycles.

[0019]

The length of the fibers is at least twice the maximum spacing of adjacent bonding lines. This ensures that almost all fibers are bonded to other fibers at a minimum of two points.

[0020]

The material of the fibers can be a thermoplastic material, particularly polypropylene or polyethylene.

[0021]

The loop length within an engagement surface located between defining connecting lines exceeds 0.5 mm.

[0022]

The support layer can be connected, in turn, to a material to be fastened. This case can be considered, for example, with hygiene products in which only one limited surface is used for fastening. By the development of the loop material in accordance with the invention, it is possible also to ensure good fastening reliability with small surface areas which are filled with the loop material.

[0023]

Furthermore, the support layer can be printed and/or glued.

[0024]

In addition to baby diapers, the loop material can also be used for fasteners on incontinence diapers, clothing, protective suits, packagings, and technical uses.

[0025]

An embodiment example of the invention shown in the drawing will be described below.

[0026]

The drawing shows:

Figure 1, a top view of the loop material according to the invention;

Figure 2, an enlarged cross section through the loop material according to Figure 1.

[0027]

The drawing shows a top view of the loop material, which consists of an originally non-reinforced, bonded fiber fabric with randomly laid staple fibers. The staple fibers have an approximate length of 40 mm. This bonded fiber fabric was subjected to a calendaring process, wherein on continuous connecting lines 10, the fibers were connected to one another and to a support layer, i.e., thermobonded.

[0028]

In this way, rhomboid-defined loop cushions, which are used as engagement surfaces 12 for the prongs of a hook surface provided with barbs.

[0029]

Figure 2 shows an enlarged cross section through the loop material according to Figure 1. A bonded fiber fabric, consisting of carded, crimped staple fibers 16, is thermobonded to a support layer 14, which can be a sheet, a fabric, or a fleece. As a result of this geometrical structure, the fibers 16 billow out and form a volume that is substantially larger than the material used for their fibers. In spite of the thermobonding, in which the fibers fuse together and also fuse with the support layer, the volume between the bonding areas 10 is largely retained. There, the fibers 16 billow out some more and form loops, whereby it is possible to engage the hooks of a hook layer.

Claims

1. Material of a hook-loop connection, comprising a support layer of a sheet, a fabric or a fleece, to which is directly fastened a fibre or filament layer by narrow, linear, parallel bonding areas and between the said bonding areas are formed hookable engagement areas of the hook-loop connection for hooks directly with the fibres or filaments of the fibre or filament layer, in which there are two groups of narrow, linear, parallel bonding areas, which cross one another and in this way form rhomboid-defined loop cushions, **characterized in that** the fibre or filament layer is in the form of a carded, voluminous

interlaid scrim or bonded fibre fabric of folded or crimped fibres or filaments, whose voluminous characteristics are exclusively based on the geometrical structure of the fibres or filaments without any additional machining of the fibre or filament layer and consequently forming the loop cushions on thermobonding.

2. Loop material according to claim 1, **characterized in that** the narrow, linear, parallel bonding areas are continuous or interrupted.

3. Loop material according to claim 1 or 2, **characterized in that** the fibre layer is formed by a carded interlaid scrim or bonded fibre fabric, in which during the production process the fibres have been given a preferred direction in the machine direction and that the narrow, linear, parallel bonding areas are in each case at an acute angle to the preferred direction of the fibres.

4. Loop material according to one of the claims 1 to 3, **characterized in that** the thickness of the interlaid scrim or bonded fibre fabric exceeds 0.15 mm.

5. Loop material according to one of the claims 1 to 4, **characterized in that** the weight per unit area of the interlaid scrim or bonded fibre fabric exceeds 8 g/m^2.

6. Loop material according to one of the claims 1 to 5, **characterized in that** the fineness of the fibres or filaments exceeds 1.7 dtex.

7. Loop material according to one of the claims 1 to 6, **characterized in that** the length of the fibres is at least twice the maximum spacing of adjacent bonding lines.

8. Loop material according to one of the claims 1 to 7, **characterized in that** the material is a thermoplastic material, particularly polypropylene or polyethylene.

9. Loop material according to one of the claims 1 to 8, **characterized in that** the loop length within an engagement surface located between defining connecting lines exceeds 0.5 mm.

10. Loop material according to one of the claims 1 to 9, **characterized in that** the support layer is connected to a material to be fastened.

11. Loop material according to one of the claims 1 to 10, **characterized in that** the support layer can be printed and/or glued.

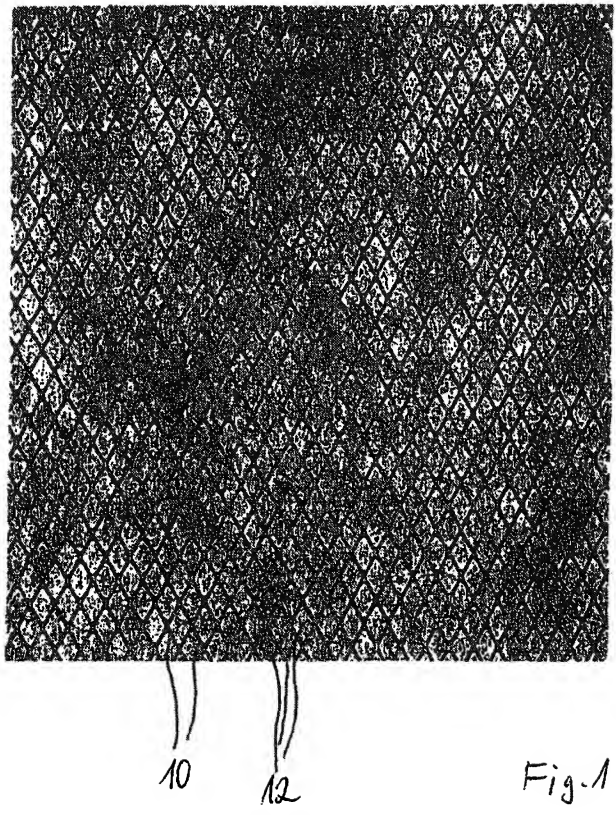

Fig.1

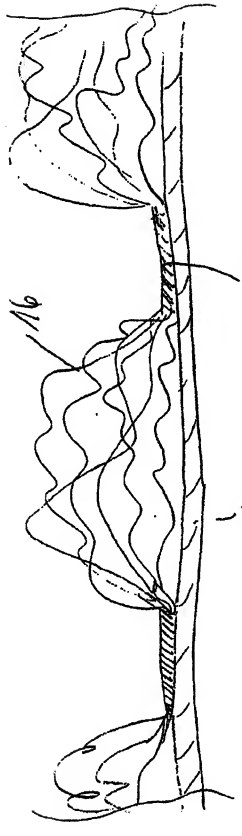

Fig. 2